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Green IT in Enterprise Practices: The Essential Role of the State CIO

Moral Imperative. Ethical Obligation. Global Duty. These and similar phrases are increasingly utilized to describe what the international community is currently facing in regards to climate change and other environmental issues. They serve to illustrate the growing sense of urgency that citizens, organizations, and governments around the world are displaying as they work to incorporate greener practices in all areas of their lives. Some may say it is not our choice to implement these practices, but rather our responsibility. To be sure, nothing evokes a universal sense of “we’re all in this together” than realizing that, well, we are. But where do state CIOs fit into this global picture of climate change and environmental impact reduction? What steps can they take to make sure that their enterprise is running in an environmentally-friendly manner?

Through the emerging trend of Green IT, state CIOs have begun to take a hard look at their enterprise IT practices and how IT support of state government functions can reduce overall environmental impact. Green practices nationwide have exploded upon the social conscience with a

vengeance and green IT initiatives are no exception. ***As with any national phenomenon, executive offices nationwide have taken note—and taken to heart that IT must be utilized in order to implement greener practices in all aspects of government.***

While the federal government has taken significant steps to establish policies and programs that promote green purchasing and practices, in the areas of greenhouse gas emission reduction, renewable portfolio standards, electronic waste and others, states are stepping out ahead of the curve to reduce environmental impact. In a clear indication that states are at the helm of advancing green strategies, the nation’s Governors are leading the way. In the fall of 2007, the National Governors Association Chair, Governor Tim Pawlenty (MN), kicked off the yearlong initiative, “Securing a Clean Energy Future” (SCEF).

The SCEF Initiative calls on all Governors to promote energy efficiency, clean technology, energy research and the deployment of alternative fuels.¹ In May of 2008, twenty states were selected by SCEF to take part

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in its “Greening State Capitols’ Initiative,” which will send engineering experts to state capitol complexes with the goal of identifying energy efficiency improvements and also demonstrating the anticipated cost savings and carbon dioxide reductions each state could experience by implementing the recommended improvements.² Additionally, according to the Pew Center on Global Climate Change, as of December 2007, 23 states have joined regional pacts to reduce greenhouse gases and 26 states had renewable portfolio standards.³

State CIOs can wield important influence in helping to promote green IT policies, and the question is not *if* a state CIO should become involved in these efforts—it’s a matter of how, when and to what extent. **State CIOs can become involved in shaping green IT policies and reducing their state’s carbon footprint in three areas: Asset Management, Energy Efficiency and enabling Green Practices through the utilization of IT.**

ASSET MANAGEMENT

When beginning to incorporate green IT practices, state CIOs can first look to the IT hardware that they use every day in their offices, as well as those across the enterprise. Desktop computers, printers, copiers and other hardware can all have a major impact on an organization’s carbon footprint. Addressing the environmental impact of an IT organization’s hardware entails consideration of full product duration. The following three factors should be considered when making the step toward greener practices that encompass a product’s entire lifecycle:

- Acquisition
- Utilization
- Disposal

Acquisition—Procuring Green

Products: When acquiring products, state CIOs can take several different areas into account in order to ensure they are getting the products that align with their

“green” goals while also meeting their budget requirements. State CIOs should examine the product itself, its efficiency regarding energy consumption, the longevity of the product and the eventual disposal of the product. In this manner, state CIOs can ensure that the product they are receiving will have a minimal environmental impact throughout its lifespan.

Purchasing certified “green” products can help minimize costs down the road. Looking at metrics such as Energy Star (ES), EPEAT (Electronic Product Environmental Assessment Tool) and Climate Savers environmental performance ratings allows state CIOs and purchasers to determine which products qualify as most environmentally-friendly and to review the comparative environmental impact of competing products. These third-party certifications are applied to personal computers and monitors, as well as a significant percentage of other IT hardware, and there is often only minimal cost differential between these products and other standard business products that do not meet the ES/EPEAT criteria. By using these metrics as a guideline, state CIOs can help lessen the environmental impact of the products they are buying enterprise-wide. Several states, such as New York, are beginning to incorporate these metrics when purchasing hardware for their enterprise.

- **How State CIOs Can Do It:** When beginning to look at purchasing products that align with your organization’s green goals, state CIOs can utilize relationships they may already have with their state procurement officials and encourage use of ES/EPEAT metrics as part of the IT hardware bid language, evaluation and contracts. They can also examine what their statutory authority may be to influence these decisions—at a minimum, state CIOs can establish desktop standards that set requirements for energy efficiency and improve desktop power efficiency.

Even if statutory authority is not immediately within their purview, state CIOs can

encourage greener purchasing by becoming familiar with, and advocating for, products that have been vetted through the EPEAT process. The EPEAT process evaluates electronic products in relation to 51 total environmental criteria; to qualify for registration as an EPEAT product, the product must conform to all the required criteria.⁴ State CIOs can also shape greener purchasing decisions through their work in enterprise architecture.

Technology Architecture: Articulating the Enterprise Vision

A key responsibility of state CIOs—and a significant contributing factor in their influence on incorporating green IT standards—is that of developing enterprise architecture (EA) standards. Through their EA authority, state CIOs can work with procurement officials to articulate green IT standards in purchasing products that are deemed environmentally-friendly. For example, existing EA standards could be updated to require that products be EPEAT-compliant.

Collaboration between EA and IT procurement is essential, and IT procurement officials should act as facilitators of agency compliance with IT standards set through the EA governance process.⁵ State CIOs can articulate their vision for a greener IT landscape through this EA governance process and take advantage of authority already vested in them in order to implement these significant initiatives.

Utilization—Making the Most of Each Product: Once a product is purchased, exploring ways to increase a product's lifecycle can have a significant environmental benefit. Within state government, products that have outlived their usefulness for one office or function may be effectively redeployed in another setting. When a product has outlived its use in state IT departments, state CIOs can look to places that may be able to re-use these products after refurbishment.

No Child Left Offline Initiative Utilizes Public-Private Partnerships

No Child Left Offline (NCLO), Connected Nation's innovative technology initiative, is bringing together public and private partners to help disadvantaged children and their families join the Information Age. The program is the most comprehensive initiative of its kind undertaken by any state as it is intended to help underprivileged individuals overcome the obstacles associated with the digital divide. No Child Left Offline places computers in the hands of underprivileged populations so they have access to abundant technological resources and can perform basic computing functions.

In Kentucky, NCLO has leveraged support from numerous private and public organizations and foundations with financial and in-kind donations exceeding \$2.3 million. The program has already initiated and executed a successful pilot project and has delivered over 2000 new and refurbished computers and other technologies to disadvantaged families and organizations across the state. The program placed refurbished state surplus computers and printers to sixth and eighth graders on the Federal Free and Reduced Lunch Program in 14 Distressed ARC Counties. As a result of the success of NCLO in Kentucky, the program has expanded to Tennessee under the name Computers 4 Kids. The program will also be operational in Ohio during the fall of this year.

State CIOs can articulate their vision for a greener IT landscape through this EA governance process and take advantage of authority already vested in them in order to implement these significant initiatives.

- **How State CIOs Can Do It:** Partnering with programs that will put these products into the hands of individuals who are in need can lessen environmental impact, as well as enable state IT departments to reach out to the community and showcase their green goals and objectives. By prolonging a product's lifecycle (while maintaining strict safeguards for data destruction and security protection), states can create cost reductions, as well as facilitate more effective management of computer assets. When equipment is

re-used, including a provision to require appropriate disposal by the end user is important to ensure the equipment is properly recycled or disposed of at the end of its useful life.

Disposal—End-of-life Management:

Once a product has reached the point of being unusable in any capacity, working to incorporate best practices for the disposal of electronic waste—commonly referred to as e-waste—is a major issue facing IT today and affects both public and private organizations. Considering the magnitude of electronic products under state government jurisdiction, the disposal of these products can have a significant environmental impact.

A number of states have already implemented take-back programs and others are beginning to take a serious look at how to handle their assets at the conclusion of their lifespan. ***Industry has responded to this issue in recent years, and the recycling of these products can be required in the contractual relationship with a supplier at the outset—integrating these considerations into the purchasing process enables a better assessment of the Total Cost of Ownership (TCO) of IT assets, as well as reduction of negative impacts on the environment.*** Recycling of these products can be easily managed once a policy is put in place—however, it is important for state CIOs to ensure that older products that are not covered under a similar contractual agreement are disposed of properly as well. State disposal organizations should consider chain of custody documentation to ensure proper disposal of waste.

Oregon Policy Embracing Acquisition and Disposal of Electronic Products

In support of the Governor's Sustainability Executive Order, Oregon adopted a policy addressing the acquisition and disposal of computers and monitors. The policy adopts EPEAT standards for acquisition of electronic products. It also addresses e-waste in that

excess electronic products must be refurbished for reuse, disposed of through statewide electronic recycling contracts or returned to manufacturers through contract “buyback” provisions for ultimate disposition in a manner that prevents hazardous materials from entering the waste stream.⁶

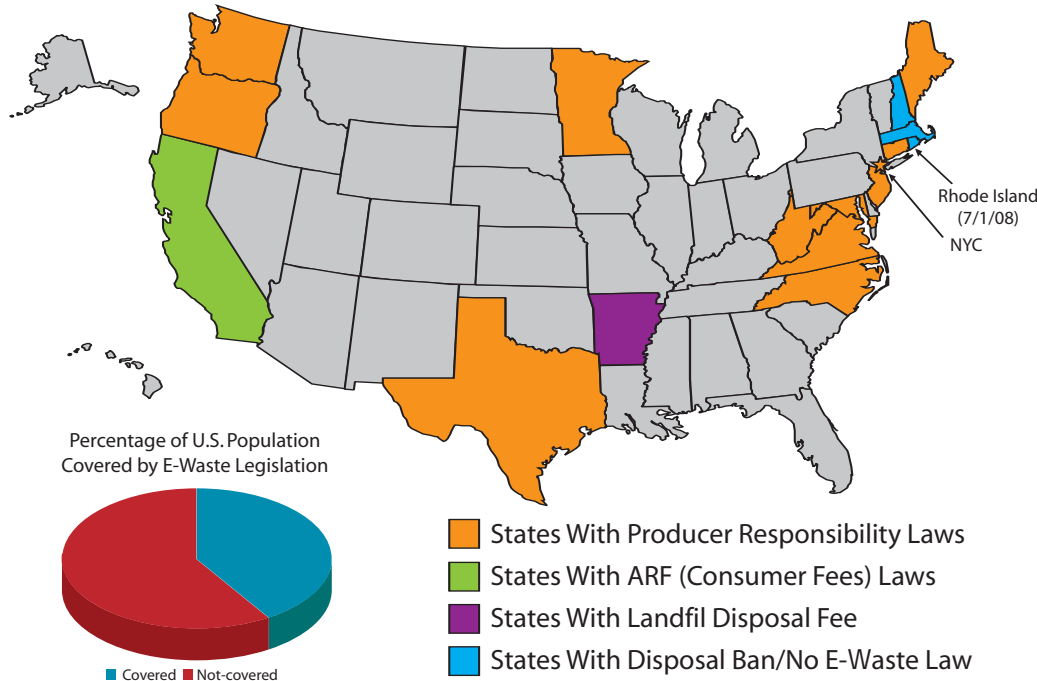
The primary e-waste contract for state agencies and other public entities in Oregon is a joint venture with a qualified rehabilitation facility (QRF). The contract allows the state to achieve its objectives of providing secure, sustainable, cost effective e-waste options and meaningful employment for people with disabilities. Under the contract, the QRF is responsible for:

- **Sanitizing data:** Ensuring that all sensitive material is removed from data collection or storage.
- **Refurbishing:** Restoring items for resale and re-use, including computers, printers, monitors, fax machines, copiers and electronic data storage devices.
- **Recycling:** Ensuring that items not fit for resale or re-use are recycled using the highest environmental standards.

There are also regulatory components to take into consideration with e-waste, and its classification as hazardous waste. While individuals do not cross the threshold for having hazardous waste in e-waste disposal, most states do. When a state disposes e-waste ineffectively, they may be liable for violations, which could result in millions of dollars in fines. Aside from economic incentives, there are regulatory incentives that require states to make sure that electronic items are being properly disposed of through a responsible recycler or hazardous waste disposal agent.

According to the National Center for Electronics Recycling, fifteen states have thus far implemented electronic recycling laws.⁷ States have implemented various types of regulations, ranging from producer responsibility laws, consumer fee laws, landfill disposal fees, and e-waste disposal ban laws.

States with E-Waste Laws



Source: NCER

- How State CIOs Can Do It:** With electronic waste, state CIOs may face a jurisdictional dispute between various units in state government. Therefore, state CIOs may not be unilaterally able to make certain changes in regards to disposal practices. However, state CIOs can identify those agencies that do have jurisdiction over these issues, typically the Department of Environmental Protection, and work to collaborate across organizational boundaries to establish best practices for e-waste disposal. State CIOs may need a policy framework in which to operate to make decisions. However, if there is a policy void or a leadership gap, there is a clear opportunity to be the “green IT champion” and initiate many of these activities.

Security Issues in Electronic Equipment Re-Use and Recycling

A major consideration for state CIOs in donating or disposing of previously used electronic products is information security.

Ensuring that state information is not inappropriately exposed is an issue that makes involvement in e-waste policy crucial for state CIOs.

Adhering to National Institute of Standards & Technology (NIST) Guidelines for Media Sanitization* results in a standard, secure, best practice approach for protecting information.⁸ For state CIOs, this is a policy issue—specifically as it relates to Enterprise Architecture and Standards. Establishing a security standard for the re-use, recycling, and disposal of electronics, and requiring stakeholder compliance is critical for helping state CIOs ensure information security for enterprise hardware. Additionally, another way for state CIOs to save resources is to merge the decommissioning of hardware for

security purposes into an e-waste management process. Often, the expense that is required in decommissioning hardware, if combined with an e-waste management process, can serve to dilute expense across two different enterprise needs.

* For more information regarding the NIST Guidelines, please visit <http://csrc.nist.gov/publications/PubsSPs.html>.

ENERGY EFFICIENCY

To keep a state IT enterprise operating, the level of energy consumption is significant and can account for a sizeable portion of a state's energy costs. Therefore, energy efficiency issues are very much of state CIO concern, and spearheading various initiatives to streamline or otherwise reduce energy consumption are prime ways that state CIOs can lead green IT efforts. ***State CIOs can look to increase their state's energy efficiency by exploring two areas that are most often under their purview—enterprise desktop power management and their state data centers.***

Desktop Power Management: According to the Climate Savers Smart Computing Initiative, the average desktop computer wastes nearly half the power delivered to it and servers waste about one-third of their power—this means higher energy costs and unnecessary greenhouse gas emissions.⁹ Research by Gartner indicates that the use-phase power consumption of computers and monitors constitute roughly 40% of the carbon emissions resulting from IT sector operations, as compared to 23% from servers (including cooling).¹⁰

Incorporating best practices for desktop power management actions and behaviors can help ensure that computer energy consumption is reduced. State CIOs can work to incorporate best practices that include:

- Shutting off desktop computers and monitors daily
- Limiting screen saver use—a typical screen saver will draw power for the monitor and will also keep the CPU from shutting down.¹¹
- Enabling power-saving features on computers such as setting “sleep” functions on desktop computers to activate automatically
- Encouraging basic environmentally-friendly practices such as double-sided printing, printer consolidation and purchasing recycled paper
- Working with vendors that offer a commitment to producing energy efficient products, invest in power management software tools and offer preloaded software that conform to power management guidelines.¹²

Kansas Implements Desktop Power Management Initiative

In Kansas, power management software which automatically powers down idle computer components after a pre-set period of time has been installed on all Department of Administration desktop computers.¹³ Implemented in December of 2007, pursuant to a request from the Governor's Office, Kansas Department of Administration's Division of Information Systems and Communications (DISC), the state has implemented a power management tool that was developed for the U.S. EPA Energy Star Program to centrally manage power management settings on Windows client workstations.¹⁴

Data Centers: The common perception is that buildings account for the majority of energy usage within a company. However, most executives do not realize that their data centers are the real energy hogs. With annual energy costs per square foot that are 10 to 30 times that of a typical office building, data centers are an important target in energy-saving efforts.¹⁵ Server hardware is no longer the primary cost in data center economics. The purchase price of a new server is

already exceeded by the capital cost of power and cooling to support it and will soon be exceeded by lifetime energy costs of the server itself.¹⁶

The cost to maintain data centers and their enormous use of power to both run and cool their infrastructure makes data centers a prime target for greening efforts in states. According to an August 2007 report released by the U.S. Environmental Protection Agency (EPA), as of 2006, the electricity use attributable to the nation's servers and data centers is estimated at about 1.5 percent of total U.S. electricity consumption; this electricity use has more than doubled since 2000 and amounts to about \$4.5 billion in electricity costs—equivalent to the electricity consumed by 5.8 million average U.S. households.¹⁷

It is estimated that federal servers and data centers accounted for roughly ten percent of this electricity use in 2006 at a total cost of \$450 million.¹⁸ These are startling figures for those who may not closely follow these trends, and several states across the nation have taken, or are beginning to take, a hard look at their own state data center energy consumption.

Energy Management in Existing Data Centers

Ideally, every state CIO would have the resources to build and operate the most cost-effective and energy-efficient data center possible. However, tight state budgets and legislative priorities don't often include brand-new state data centers, and in those cases state CIOs must turn to energy reduction strategies to extend the useful life of their existing data centers. Since the data center energy challenge affects both the physical infrastructure and IT equipment, actions should include both aspects of energy usage. **The key strategies for energy management include consolidating physical data centers, implementing virtualization technologies, and improving data center facilities management by incorporating innovative heating and**

cooling initiatives.

- **Consolidation:** Energy efficiency is a major element in establishing the business case for combining an enterprise's disparate data centers into a consolidated environment. In NASCIO's 2007 survey of data center consolidation in the states, over 40% of state respondents cited energy conservation/environmental concerns as a driver for their state's strategy to consolidate data centers.¹⁹ Among several other benefits, consolidation is widely viewed as an effective way to reduce a state's carbon footprint.

Additionally, many states that have, or are in the process of, consolidating their data centers are choosing to locate their primary data center outside of the state capital in order to help lower energy costs since operational costs are likely to be lower outside of an urban area. As an added benefit, locating a central enterprise data center in an alternative area can lend itself to disaster recovery and business continuity efforts, in case of a catastrophic event in the state's capital city.

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North Carolina's Consolidation Program

North Carolina is improving their state's IT related carbon footprint through process, technology and architectural improvements. This consolidation initiative, a statewide strategic effort, is implementing these improvements across all state agencies. This multiyear program will help reduce carbon footprint by decreasing the amount of data centers, servers and associated IT infrastructure that are required to deliver services to our citizens and employees. This program is in its second execution phase, and the eight participating agencies will eliminate their local data centers and will reduce the number of physical servers by 35%.

- **Virtualization:** Virtualization allows multiple virtual servers to run on one physical server, regardless of platform,

and has become one of the fastest-growing trends in IT. By streamlining the number of physical servers, floor space is thereby reduced. Cooling and capital costs are also reduced, while the utilization of servers increases—all lending to energy efficiency efforts.²⁰ Similar to consolidation, virtualization efforts are often undertaken with a business continuity benefit in mind, and these benefits are far-reaching. While the green benefits are often not the initial business driver in implementing virtualization technology, they can serve as an added incentive for funding and implementation.

When analyzing what should be done—and what physically can be done—to incorporate energy reduction efforts in a retrofitted data center, it is crucial to first assess the space with which you are working.

When contemplating consolidation or virtualization, it is critical that state CIOs be aware of the challenges that may lie in the interpretation of U.S. Office of Management and Budget (OMB) Circular A-87 guidelines with respect to virtual servers. Effectively applying cost-allocation requirements is essential so that cost penalties may be avoided.

- **Retrofitting Data Centers:**

Retrofitting an existing data center is viewed as a less costly alternative to breaking ground on a new building. While there are physical limitations to consider, and existing heating and cooling designs that may complicate implementation of innovative systems, retrofitting is generally considered to be a cost-effective way to implement energy reduction solutions without waiting for funding for a new data center.

When analyzing what should be done—and what physically can be done—to incorporate energy reduction efforts in a retrofitted data center, it is crucial to first assess the space with which you are working. Certain vendors and other organizations offer energy assessments that can be conducted at the outset of a retrofit initiative. Such an assessment can be critical in determining first steps and establishing a realistic set of

goals and objectives for each particular space that is to be retrofitted.

California Responds to Energy Consumption Executive Order Through its Data Center

The California Department of Technology Services (DTS) completed a data center retro-commissioning project that was initiated to improve the building's overall performance by reducing consumption of electricity and natural gas, address operational inefficiencies, and improve occupant comfort—as well as manage climate change and nurture a green culture.

Innovative improvements were made as a result of this project, including an upgrade of the energy management system (EMS) with advanced trending and chiller-plant monitoring capability, implementation of state-of-the-art control sequences, and development of an energy management plan for this high-density data center.

Not only did the project meet the goals of reducing grid-based energy consumption as directed by the Governor's Executive Order S-20-04, the state benefited from reduced energy costs and environmental improvements. As a direct result of this project, the DTS realized an 8.8% reduction in annual electrical power consumption and a 69% reduction in annual natural gas usage, contributing to an annual energy cost savings of \$68,000 or 9% of the current annual energy cost incurred by the facility.

This effort also identified the potential to reduce annual energy consumption by an additional 10% with future implementation of capital improvement energy efficiency measures (EEMs) and low-cost EEMs for the data center. These future capital improvements include the following measures:

- Thermal energy storage
- Cooling towers cross connect
- Variable frequency drives for chillers, air handlers, fans and pumps

- Cross connect hot ducts to efficiently stage gas-fired heaters
- Cooling tower free-cooling

- **Heating and Cooling Initiatives:**

There are several factors to consider when incorporating energy efficiency efforts in existing data centers. State CIOs must work to assess their state's resources and limitations in order to determine the best strategy for their state going forward. Various methods of air and water cooling can be utilized, and each space will require its own unique method according to its individual capabilities. Activating power management automatic controls for servers, and turning on and utilizing air conditioning economizers which act as temperature sensors in the data center can reduce energy usage.²¹ Utilizing outside air during cooler months, particular in northern states, can also be a way to incorporate cool air into the data center without using much energy.

Innovative heating and cooling strategies for data center management are largely considered to be the “low-hanging fruit” of energy efficiency solutions that state CIOs can utilize. These new technologies don't have to cost millions of dollars in implementation and maintenance costs—and while some may not be the ultimate fix for maximum energy efficiency, they are steps that state CIOs can take today to begin to reduce energy costs for their state without waiting for funding for a new data center.

New Data Centers: What to Consider When Starting Fresh

Fortunately, there are states that have allocated funding for new data centers, and there are state CIOs today who have begun to develop—or have already completed—a new data center for their enterprise. Considering the operation and

design standards for a new data center can be no small challenge for a state CIO in embarking on this significant undertaking, and the challenges involved in building standards along the way are many.

- **Operation System and Design:**

According to the Green Grid, a non-profit organization comprised of IT industry professionals, the data center system design has a much greater effect on the electrical consumption in data centers than does the efficiency of individual devices.²² Laying out the data center and designing particular elements in certain ways will help maximize cooling efforts and help minimize energy bills. Also, states can explore their options for procuring new servers with a smaller energy footprint.

- **Building Standards:** States, to varying degrees, have expectations about the environmental impact of not just the physical infrastructure within a data center, but the data center facility itself. The U.S. Green Building Council has established the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, which is a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings.²³ Similar to EPEAT ratings, LEED ratings designate buildings as environmentally-friendly facilities. As states increasingly explore ways to lessen their carbon footprints, holding buildings to higher LEED rating standards may become common practice.

Data Center Energy Efficiency a Goal for Washington State

The State of Washington is currently in the process of planning for a new data center for their IT enterprise. State office buildings in Washington must now be built to be compliant with a LEED Silver rating at a minimum. While the nature of a

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data center is not compatible with this level of compliance, the state is working to ensure they have an efficient data center that aligns with their state's green goals of energy efficiency and minimal environmental impact.

Locating the data center on the state campus in Olympia, they are focusing on three areas that will lend to energy efficiency—roof handlers for airside cooling, implementing a comprehensive virtualization program, and investing in super-efficient uninterrupted power supply. By incorporating these measures, and implementing strict monitoring processes, Washington State is working to make sure that their new data center is as environmentally-friendly, and also as effective for their business needs, as possible.

Enabling Green Practices with IT

State CIOs do not often have to look far to find examples of greener practices that are already in place—they can simply look within their own departments to find existing technologies with which to incorporate green IT initiatives. These existing technologies help support major aspects of a state's policy agenda—including initiatives such as statewide broadband efforts, telemedicine, distance learning and intelligent transportation systems (ITS).

There are numerous examples, at all levels of government and throughout many branches of public service, such as health-care, public safety and education where IT can be found enhancing citizen service and reducing a state's carbon footprint.

Three significant ways in which IT lends to greener practices are through e-government, Geographic Information Systems (GIS) and also through telework and other "virtual office" initiatives.

E-Government: State CIOs have been working for years to implement e-government initiatives as a means to reduce costs

and to simplify citizen services by allowing them to conduct certain business online rather than "in line." There are hundreds of examples of e-government initiatives which allow citizens to obtain copies of vital records, register vehicles, and pay fees, tickets and taxes online among other services. Citizens can also use state websites and portals to gain access to a multitude of state informational resources such as health, public safety, housing, inspection, state parks, and many others. These e-government initiatives, and others like them, not only allow citizens to access information when and where they want, but also tie in to a state's green practices.

By cutting previously required citizen travel to state office buildings, e-government initiatives contribute to greenhouse gas emission reduction by eliminating the necessity for citizens to travel, which in turn cuts down on roadway traffic. Even though most e-government initiatives may not have been initially developed with specific green IT goals in mind, they can frequently serve that dual purpose. For instance, California's Department of Motor Vehicles (DMV) has been offering e-government services for several years; among the more popular services that California drivers take advantage of over the internet are Driver License Renewal, Vehicle Registration Renewal, and Personal License Plate Reservations. Together, these services logged more than 5.4 million transactions in 2007. Using an average round-trip length of 10 miles, California drivers avoided about 225 tons of air pollution in 2007 by using the internet for these popular DMV services. That amounts to more than a third of the air pollution generated by all industrial process in California on a daily basis.

Geographic Information Systems (GIS):

GIS technology provides a way that state CIOs can utilize their existing resources to leverage green objectives and help decrease their carbon footprint through a variety of different ways. For many years, maps and GIS analysis tools have been a mainstay in environmental planning and regulation resulting in improvements in air and water

quality, better siting of landfills, among many others. ***While many states are utilizing GIS in some capacity to enable green practices, the initiatives listed below demonstrate the diverse ways that GIS is utilized in driving toward green benefits.***

Making Wind Into Energy in Montana:

Cascade County, Montana, is finding extra revenue in an unexpected place. Through wind turbines, the air that flows through rural Cascade County and many other parts of Montana can be captured and utilized to produce an alternative source for energy, contributing to overall carbon footprint reduction. The County utilized its pre-existing GIS tool, which showed wind providers information about the land that they could not get anywhere else from just one application. The tax revenue from the wind turbines, as well as the extra income given to landowners, adds up to significant revenue for the county and a cleaner environment through alternative energy.²⁴

Tracking Carbon Sequestration in

Pennsylvania: Through enhancements to Pennsylvania's Seamless Digital Base Map (PAMAP)²⁵, the Commonwealth has the ability to continually measure statewide biomass changes and forest carbon sequestration. Through their work on the Midwest Regional Carbon Sequestration Partnership,²⁶ they have mapped major Pennsylvania stationary carbon emissions sources and potential geologic sinks in the western part of the state. The state hopes to map geologic sequestration resources for the entire Commonwealth over the next 3-5 years and plans to develop protocols for siting and operating state geologic sequestration projects. Through the use of GIS technology, Pennsylvania is able to track and monitor carbon sequestration in the Commonwealth.

States are responsible for managing hundreds of people on the move in the field, whether they are food inspectors, natural resource field crews, foster care case workers, road maintenance crews or others. GIS technology can be used to

efficiently route state workers resulting in fewer miles driven and less gas used per day. GIS allows a comprehensive view of open space holdings of the state, local governments and non-profits to set priorities for additional purchases. In many cases, this allows for the creation of ribbons of trails that can serve as biker commuter routes and offers an alternative to driving to work.

Telework Initiatives: With the rapid adoption of technologies that allow citizens to interact online in real-time such as wikis, discussion boards and web conferencing tools, it is becoming significantly easier for employers to offer employees an option to work from alternative locations. State government, often thought to be behind the curve of such emerging trends, has increasingly begun to embrace telework as an option for its employees.

Several states now have teleworking components in place that incorporate all aspects of a modern "virtual office," including web-conferencing, online training, virtual collaboration and more. NASCIO's 2007 State IT Workforce survey respondents, when asked what attracts new workers to their state, placed Workplace Flexibility second only to the benefits package.²⁷

This powerful employee recruitment and retention tool can also serve to significantly decrease a state organization's carbon footprint by putting less traffic on the roadways, hence reducing greenhouse gas emissions.

Arizona: The state of Arizona has adopted web conferencing technology throughout their agencies as a means to cut mileage, fuel, vehicle use and travel; the software charts the distance between web conference participants and then calculates cost savings based on the likely method of travel and the amount of fuel that would be used.²⁸ Overall, the state of Arizona has tracked a CO₂ footprint saving of 300,000 pounds in the first quarter of 2008.²⁹



By articulating the enterprise vision and emphasizing a sense of urgency in implementing green initiatives, advocating for the green benefits at the outset of a project, and making these green benefits part of the driver for a project, state CIOs may increase stakeholder buy-in and foster a sense of greater good in the initiative in which they are working to implement.

California: The California Environmental Protection Agency (Cal/EPA) uses telework to reduce traffic and associated air pollution, and in some cases, achieve greater productivity. Cal/EPA managers understand their teleworkers are simply performing the same job in a different place and are consequently held to the same standards as in-office employees. This is facilitated by thoughtfully constructed telework plans that delineate an employee's responsibilities with enforceable guidelines.

The air pollution emissions averted through teleworking are quantifiable—Cal/EPA's Department of Toxic Substances Control (DTSC) estimates that teleworking avoids about 180 tons of air pollution annually. ***If all California's state service employees telecommuted at the level of the DTSC's average, 40,250 tons of air pollution per year could be avoided, an amount greater than one day's worth of air pollution from the collective sources in the state.*** This is the cumulative of having an entire day without any air pollution at all.

The Other Side—How State CIOs Can Get to Greener Pastures

The landscape of the role of the state CIO is rich, varied and constantly evolving. State CIOs must continuously change hats to adapt to different roles in their positions—from “keeping the lights on” tasks to working to integrate innovative solutions regarding a multitude of issues facing state government using IT. Keeping up with emerging trends, and working to implement them into their projects, is an integral part of a state CIO position.

State CIOs are now finding themselves to be crucial players in areas such as health-care IT, Medicaid reform, e-discovery, and a host of other issues that have just recently begun to garner state CIO attention. Green IT is among these emerging trends and state CIOs are beginning to find their role among the many stakeholders

involved in green practices. ***State CIOs must now utilize existing technologies, and work to incorporate new ones, into their enterprise green IT policies and practices.*** To do this, state CIOs must take steps to move green benefits to the forefront of their strategic thinking.

- **Thinking Green:** As this brief has outlined, state CIOs can achieve green results in the short term using technologies and ratings systems that already exist and can significantly reduce the environmental impacts of future project operations in the longer term by establishing systems and planning now. ***Yet, working to think “green” strategically, and to see its benefits with an enterprise view, will require a shift in not only the way new projects are pitched, but also in the mindset of the state CIO.***

Projects such as data center consolidation, integrating virtualization technology, and incorporating telework programs typically are done for reasons other than the immediate green benefits they pose. However, by articulating the enterprise vision and emphasizing a sense of urgency in implementing green initiatives, advocating for the green benefits at the outset of a project, and making these green benefits part of the driver for a project, state CIOs may increase stakeholder buy-in and foster a sense of greater good in the initiative in which they are working to implement.

- **Develop a Plan:** Working to develop a green IT plan for the enterprise can be a first step toward implementation of greener practices. Those states that have developed green IT plans, including Missouri, Kansas and Oregon, have incorporated ideas for green efforts in nearly every aspect of their jurisdiction as state CIOs. These include several of the areas discussed in this brief such as equipment purchasing, recycling, and data center consolidation and virtualization, among others. Reaching out to states that have developed

plans, and learning about steps they are taking, can help you on the path toward implementing green IT initiatives.

- **Establish a Baseline and Determine a Metric:** Before a state CIO can move a project forward, they must ascertain where their state is at currently in regards to energy consumed, greenhouse gas emitted, etc. To adequately measure success, you must know or have an estimate of where you began before you can decipher how far you've come at a project's completion. Developing a baseline and a way to measure progress can be built into a total carbon footprint reduction plan at the outset of an initiative and can be key to overall project success.

For example, one way to determine a state's energy use in its data center is to get an assessment of how much energy is used and how energy efficient a data center is operating. The Green Grid and other industry groups have published a metric which can tell state CIOs how much energy is spent on the productive use of IT versus the amount wasted on the physical infrastructure. Getting the facts is a good way to start managing the problem—and yet less than 20% of companies in the United States have done a basic energy audit.³⁰

- **Track and Monitor Success:** Once a metric is determined, state CIOs must continue to track and monitor a project's success rate. For example, in following a data center consolidation initiative, examining the energy usage rate prior to consolidation and then comparing that to energy usage in the aftermath of consolidation can help determine success and show the benefits accrued from the project. Making sure that those benefits continue to be realized and that the project maintains a level of success is an important way that state CIOs can continue to justify maintenance costs.

- **Become a Transformational Leader:** State CIOs may not immediately have authority to implement certain programs or initiatives designed to have green benefits. Utilizing existing authority through enterprise architecture or other means can help state CIOs drive toward greener practices without making major jurisdictional policy changes. In other cases, such as telework, state CIOs must often work to gain authority to implement these programs for their employees.

State CIOs using enterprise-wide leadership skills can work across organizational boundary to transform existing practices into green practices. For instance, despite the significant increases in employer adoption of telework, it still remains a subject of debate, particularly among older workers. In order to incorporate a telework process, state policy issues must first be resolved, some of which may pose significant obstacles.³¹ However, by emphasizing these green benefits of telework, state CIOs may be better poised to advocate for the implementation of these initiatives.

- **Don't Go It Alone—Enlist Your Partners:** Collaborate with other agencies within your state to establish jurisdiction and authority and to gain buy-in for a green IT initiative or agenda. Also, reach out to other states to gather best practices and lessons learned, gauge success stories and assess project failures before deciding to embark on a similar initiative.³² Often, your greatest resource can be your peers. Also, engage your staff in these initiatives—they also hold a stake in enterprise success and may be eager to help drive these green efforts.

Collaboration with vendors is also critical for green IT success. There are a multitude of vendors that offer green components to their products and services, as well as those solely dedicated to incorporating green practices. Communicating with



existing vendors that green initiatives are important to your state will be a driver for them to incorporate greener practices as well.

- **Leverage the Circumstances:** With rising energy costs, particularly fuel prices, on the mind of nearly every citizen and lawmaker, green initiatives will likely be met with unprecedented support. Now, more than ever before, promoting the green benefits of a program will be seen as a major advantage by legislatures and executive offices. State CIOs are uniquely poised to become leaders in the green IT revolution—some have already established themselves solidly in their states as a key driver in green IT policy implementation.

Much like other emerging IT trends, state CIOs can either choose to take the lead at the outset, or risk missing an opportunity to shape policies that will likely affect them eventually. Green IT efforts appear certain to only increase in prevalence—and in turn, in regulatory mandates—as public opinion and therefore legislative action increasingly favor environmentally-friendly initiatives. State CIOs who begin to explore green practices now will be ahead of the curve when these mandates become effective.

By advocating for green practices in the use of IT, reducing energy consumption, and by helping to enable activities to reduce greenhouse gas emissions, state CIOs can have a significant impact in reducing their state's carbon footprint. These actions are not just good for the environment, but also positions state IT organizations and systems to better manage future demands and achieve more effective outcomes for the state business applications they support.

Taking public service to the next level, state CIOs now have a chance to contribute to the greater good far beyond their IT departments by working to establish more sustainable IT practices and policies will have a lasting effect on generations to come.

Appendix A: Endnotes

- ¹ NGA's Chair Initiative, 2008. www.nga.org/portal/site/nga/menuitem.751b186f65e10b568a278
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- ⁴ EPEAT Criteria. Accessed May 2008. www.epeat.net/Criteria.aspx
- ⁵ *IT Procurement and Enterprise Architecture: Recognizing the Mutual Benefits*. October 2005. Page 11. www.nascio.org/publications/documents/NASCIO-EA_IT_Procurement_Brief100305.pdf
- ⁶ Oregon Department of Administrative Services Statewide Policy, January 2007. <http://oregon.gov/DAS/OP/docs/policy/state/107-009-0050.pdf>
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- ⁸ NIST Special Publication 800-88, September 2006, http://csrc.nist.gov/publications/NISTSP800-88_rev1.pdf
- ⁹ Climate Savers Computing Initiative White Paper, November 30, 2007. Page 1. www.climatesaverscomputing.org/media/whitepaper11302007.pdf
- ¹⁰ "Green IT – Dealing With the New Industry Shockwave – Part 2" Gartner Presentation by Simon Mingay for Gartner Symposium ITXPO 2007.
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- ¹³ Kansas Department of Administration, Division of Information Systems and Communications (DISC). FY 2007 Annual Report. www.da.ks.gov/disc/AnnualReportFY07.pdf
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- ¹⁵ "Measuring and Managing Data Center Energy Use – Findings and Resulting Best Practices From a Study of 22 Data Centers." HPAC Engineer, March 2006 by William Tschudi, Evan Mills, Steven Greenberg and Peter Rumsey.
- ¹⁶ EPA Report, August 2007. www.energystar.gov
- ¹⁷ EPA Report, August 2007, Page 25. www.energystar.gov
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¹⁹ NASCIO's *Survey on Enterprise Data Center Consolidation in the States: Strategies and Business Justification*. August 2007. www.nascio.org/publications/documents/NASCIO-EnterpriseDataCenterConsolidation.pdf

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²³ U.S. Green Building Council LEED homepage: www.usgbc.org/DisplayPage.aspx?CategoryID=19

²⁴ "Turning Over a New Leaf," *Government Technology*, May 2008 issue. Pages 19-20. www.govtech.com/gt/articles/312695?id=&story_pg=3

²⁵ For more information on PAMAP, please visit www.dcnr.state.pa.us/topogeo/pamap/index.aspx.

²⁶ For more information on the DCNR Carbon Management Plan, please visit www.dcnr.state.pa.us/carbon.

²⁷ *State IT Workforce: Here Today, Gone Tomorrow?* NASCIO, September 2007. Page 16. www.nascio.org/publications/documents/NASCIO-HereTodayGone%20Tomorrow.pdf

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Appendix B: Additional Resources

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